GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY OF WEST AFRICAN DWARF BUCKS FED *Ficus polita* LEAVES WITH CASSAVA BASED CONCENTRATE DIETS.

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ABSTRACT.

This study investigated the performance of West African Dwarf bucks (WAD) fed Ficus polita leaves supplemented with diets containing graded levels of cassava peel meal (CPM). A total of 20 WAD bucks were used and were randomly divided into 5 treatment groups of 4 animals per group. The animal groups were allotted the treatment diets in Table 1, in a completely randomized design (CRD). Parameters measured were growth indices and nutrient digestibility. The experiment lasted for 97 days. Results showed the total concentrate intake was 14.91kg, 16.22kg, 17.39kg, 15.30kg and 10.37kg for 0 %, 25 %, 50 %, 75 % and 100% cassava peel meal (CPM) respectively. There were no significant differences ($P>0.05$) among the treatment groups for total feed intake, average feed intake, total weight gain and average weight gain. Feed conversion ratio showed significant differences ($P<0.05$) between the experimental groups. Diet containing 100 % CPM had significant better value ($P<0.05$) than the rest of the treatments, while 0 %, 25 %, 50 %, and 75 % CPM were similar. There were no significant differences ($P<0.05$) in all the nutrient digestibility parameters with the exception of hemicellulose. This results show that the CPM is safe and not harmful to the health of the animals. The use of CPM is environmental friendly as it helped to reduce the levels of environmental pollution from the inappropriate disposal methods and therefore livestock farmers can incorporate up to 100% CPM in the diet of their animals.

Keywords: cassava peel meal; ficus polita; performance, WAD

INTRODUCTION

Livestock is essential for increased agricultural production in Nigeria. Among livestock based vocations, goat, pig and poultry occupy a pivotal position because of their huge potential to bring about rapid economic growth. In Nigeria, goats are kept as a dynamic component of farming activities, particularly by smallholder farmers. A large number of rural households raise goats with a herd size varying from 3 to 10 heads. These herds represent more than 90% of total goat population in Nigeria (Akpa *et al*., 2000). Therefore increasing productivity of goats will contribute significantly to the improvement of the living standard of the rural people (Odubote *et al*., 1992). The increasing economic importance of goat meat production can be attributed both to a strong demand for goat meat and to an interest in ecologically sound forms of vegetation control. Demand is currently about double the domestic production, so there is sufficient room for expansion (Coffey, 2006). Browse plants serve as food source for ruminants especially goats during the period of feed scarcity in Nigeria. *Ficus ……* plants are tolerant to harsh weather resulting in wide distribution. It is spread in Africa (Roneted *et al.,* 2007) and it is usually available all through the year.

Cassava peels can be acquired after the tubers have been water-cleansed and peeled mechanically (Aro *et al.,* 2010). They may contain high amounts of cyanogenic glycosides and have complex protein content than other tuber parts (Tewe, 2004). Pipat (2011) reported that Cassava peels have a low protein content (< 5% DM) and a high and variable fiber content (crude fiber in the 10-30% DM range). This profile is comparable to those of maize particularly in DM and similar to maize offal. Thus cassava peels if properly harnessed can be used as a viable energy feedstuff in small ruminant diets for increased production at reduced cost.

MATERIALS AND METHODS

All the experimental procedures including animal care, management and sampling were performed in accordance with the guidelines for livestock experiment in the ethics of keeping animals in Joseph Sarwuan Tarka University, Makurdi, Benue State. The experiment was conducted on the Livestock Teaching and Research Farm of the University. Twenty (20) West African Dwarf bucks of about 5 to 8 months of age were used for the experiment. The animals were procured from goat farmers within Makurdi metropolis. They were quarantined on arrival, thereafter, vaccinated against *pestes des petis ruminants* (PPR) and administered with multivitamins. They were dewormed using Ivermectin to control endo and ectoparasites so as to stabilise the bucks before the commencement of the feeding trial.

Cassava peel was obtained within Makurdi metropolis, from local farmers who peel cassava for *garri and akpu* production. The peels were water-cleaned, soaked in water for 48hours to allow for fermentation, then removed and sundried for 8 to 12hours depending on the prevailing wind and humidity till crispy to touch, they were crushed and kept in bags till the period of usage. Other feed ingredients (maize offal, full fat soya bean, bone ash and common salt) were purchased from North bank market in Makurdi. Brewers dried grain (BDG) was obtained from women that prepared local drinks (*Burukutu*) within North Bank and rice offal collected from rice mill within North Bank market. *Ficus polita* leaves were harvested within the experimental site. Five (5) experimental diets were formulated and compounded to contain 0%, 25%, 50%,75% and 100% of cassava peel meal (CPM) as replacement for maize offal and designated T1, T2, T3, T4 and T5, respectively (Table 1). Treatment 1 (T1) was the control and contained 100% maize offal without CPM.

TABLE 1: Ingredient Composition and Chemical Composition of Experimental Diets

Ingredient %	**T1 (0%CPM)**	**T2 (25%CPM)**	**T3 (50%CPM)**	**T4 (75%CPM)**	**T5 (100% CPM)**
Maize Offal	44. 17	33. 13	22. 09	11. 04	0.00
Cassava Peal Meal	0. 00	11. 04	22. 09	33. 13	44.17
FFSB	18. 74	18. 74	18. 74	18. 74	18.74
Rice Offal	22. 09	22. 09	22. 09	22. 09	22.09
Brewer's Dried Grain	10. 00	10. 00	10. 00	10. 00	10.00
Bone Ash	3. 00	3. 00	3. 00	3. 00	3.00
Common Salt	2. 00	2. 00	2. 00	2. 00	2.00
Total	100. 00	100. 00	100. 00	100. 00	100.00
Determined analysis (%)					
Crude Protein	17.25	17.09	16.91	16.74	17.23
Crude Fibre	9.65	9.44	9.24	7.39	8.82
Ether Extract	3.08	3.04	3.00	2.97	2.94

Ash	7.17	7.06	6.95	6.85	6.73
NFE	48.07	48.69	49.37	50.02	50.67
Lignin	11.80	9.90	9.45	7.88	9.90
ADF	29.62	30.74	31.19	31.84	29.58
NDF	18.53	59.36	59.90	60.28	60.52
Cellulose	28.44	25.87	29.12	28.78	26.99
Hemicellulose	46.99	50.26	51.05	50.70	50.99

ADF-acid detergent fibre, NDF- neutral detergent fibre,

The experimental house was a high walled building with adequate windows as well as high roof for proper ventilation. The house was divided into pens and each pen was divided into individual compartments. The concrete floor was covered with wood shavings to act as litter materials as well as beddings. Each compartment was equipped with feeding troughs and drinkers.

Two weeks before the arrival of the animals, the animal house was thoroughly washed using disinfectant (Izal) and allowed to dry after which wood shavings were spread on the floor. The drinkers and feeders were properly washed and allowed to dry, and then arranged. On arrival, the animals were weighed and randomly distributed into five treatment groups of four animals each. The concentrate diets were fed daily at the rate of 2.5% of the buck's weight at 8:00hr and 10:00hr, daily and a period of one hour was allowed before feeding the forage *ad libitum.* Feeding of the forage was divided into two i.e. the first feeding was at about 10:00hr while the second feeding was at 14:00 hr, this was to help reduce feed wastage and encourage intake. Mineral supplements were also provided for each animal. All the experimental animals were provided with fresh clean water daily.

The growth parameters measured includes; feed intake (FI), body weight gain (BWG) and feed conversion ratio (FCR). Feed intake was obtained by subtracting the weight of left over feed from the weight of feed given, on daily basis. The bucks were weighed at the start of the feeding trial to obtain the initial live weight and subsequently weekly. Body weight gain was determined by subtracting the initial live weight from the final live weight of the animals on weekly basis. Feed conversion ratio (FCR) was obtained by dividing feed intake (FI) by the body weight gain, of experimental animals. During the last week of the experiment, one animal each from the experimental groups was transferred to digestibility cages fitted with plastic nets below to collect faecal droppings. Faecal samples were collected daily, weighed, oven dried to constant weight at a temperature of 105^0C, thereafter they were put in desiccators. At the end of 7 days all the samples were bulked by replicates, thoroughly mixed and sub-samples were taken for proximate analysis. The apparent nutrient digestibility was calculated using the formula below.

$$\text{Apparent Nutrient Digestibility} = \frac{\text{Nutrient consumed} - \text{Nutrient Voided}}{NutrientsConsumed} X\ 100$$

Samples of the feed, feed ingredients and faecal samples were analysed for their proximate component by the methods of AOAC. (2000). The experimental design for the study was Completely Randomized Design (CRD).The goats were randomly distributed into five (5) experimental groups, with each group containing four (4) animals, and each animal served as a replicate. The feeding trial lasted for a period of ninety seven (97) days. Data collected from the study were subjected to the analysis of variance

(ANOVA) using the Minitab 14 (1991) statistical software. Means that showed significant differences were separated using fisher's least square difference (LSD).

Results and Discussion

Growth performance characteristics table is presented in Table 2. There was no significant difference (P>0.05) in all the performance parameters measure except feed conversion ratio which differs significantly (P<0.05). The final weight of the bucks ranged from 10.56-11.48kg. This is an indication that the experimental diets support the growth of the bucks and that treatment four (T4) had the highest value. Observed value was higher than values (8.08-8.38kg) reported by Ukanwoko and Ironkwe (2012) when WAD goats were fed Leucaena, gliricidia and cassava leaf meal-casssava peel based diets. Ukanwoko and Ibeawuchi (2012) however observed a similar value of 10.1-11.1kg when WAD goats were fed cassava peel – cassava leaf meal based diets. The animals were able to acquire considerable weight as a result of the crude protein content of the experimental diets which varies from 16.74-17.25%. The total feed intake ranged from 10-17.39kg, treatment four (T3) had the highest feed intake while T5 had the lowest. This could be as a result of the level of hydrogen cyanides in the experimental diets. There was no significant difference in the average weight gain which varies from 39.00-51.86g/day. Observed values were higher than 30.00-36.96g/d reported by Ukanwoko and Ironkwe (2012) when WAD goats were fed leucaena, gliricidia and cassava leaf meal-casssava peel based diets. Ahamefule *et al*. (2015) however observed a higher value when WAD bucks were fed pigeon pea-cassava peel based diets. There was significant difference (P<0.05) in the FCR. Treatment five (T5) had a better performance as it was able to convert feed to flesh by consuming little quantity of feed and the test ingredients contain appreciable quantity of minerals.

TABLE 2: Performance of WAD Bucks fed the Experimental Diets

Parameters	T1	T2	T3	T4	T5	SEM	P-VALUE
Initial weight (kg)	7.85	7.85	7.85	7.85	7.85	0.85	1.00
Final weight (kg)	10.56	10.83	10.85	10.78	11.48	0.73	0.93
Total feed intake (kg)	14.91	16.22	17.39	15.30	10.37	0.87	0.09
Average daily feed intake (g)	213.00	231.71	248.43	218.57	148.14	35.76	1.25
Total weight gain (kg)	2.73	2.98	3.00	2.93	3.63	0.11	0.12
Average daily weight gain (g)	39.00	42.57	42.86	41.86	51.86	0.83	1.38
FCR	5.55^{b}	5.45^{b}	5.86^{b}	5.39^{b}	2.95^{a}	0.35	0.03

abcMeans on the same row having different superscripts are significantly different

FCR: feed conversion ratio

The nutrient digestibility of varying cassava peel meal fed to WAD buck is presented in Table 3. There was no significant different (P>0.05) among the treatments means in nutrient digestibility except of hemicellulose which differs significantly (P<0.05). Dry matter digestibility coefficient ranged from 21.13-51.81%. Crude protein digestibility was highest for T2 while the remaining experimental treatments were moderate. This is an indication that the protein in the diets was adequate and could have enhanced microbial protein synthesis and consequently improved intake and digestibility. Digestibility

coefficient of crude fibre was low, implying that the animals were unable to get enough fibre needed. This is evident in the coefficient of NFE which was also low and T5 had negative value, this could be due to the fact the T5 did not have enough fermentable carbohydrate. The high ether extract digestibility in this study is an indication that the experimental treatments had enough fat for normal functioning of the vital organs of the body. Idowu *et al*. (2013) however reported a higher digestibility coefficient for dry matter, crude protein, crude fibre, ether extract and NFE when WAD sheep was fed with toasted *Enterolobium cyclocarpum* seeds as Supplement to *Panicum maximum.* There was no treatment effect on the fibre fraction parameters. Observed values for ADF, ADL and NDF in this study were similar with values reported by Kume *et al*. (2018) when varying levels of yam peels was used in the diets of red Sokoto bucks. Observed values of NDF and ADF digestibility were higher than 30.70–38.89% and 18.58–20.25% reported by Ibhaze *et al.* (2014) for WAD goats fed mixture of corncobs, cassava peels, and brewer's grain. Lower values of 23.80–32.69% and 17.24–21.42% NDF and ADF were also reported by Alikwe *et al*. (2012) for WAD goat fed maize bran and wheat offal as supplements. However, Sanwo *et al*. (2011) reported higher NDF and ADF digestibility value of 75.13–86.17% and 66.45–82.03% respectively for goats fed melon husk and palm oil slurry at 30% inclusion level. The levels of ADF and NDF are critical because they impact animal productivity and digestion. The level of ADF in a diet is a determinant of the level of digestibility as they are inversely related. The level of NDF in the diets is also a function of the level of maturity of most of the feed ingredients before harvest.

TABLE 3: Nutrient Digestibility of WAD Buck fed the Experimental Diets

Parameters	T1	T2	T3	T4	T5	SEM	P-VALUE
Dry matter %	42.52	51.81	51.60	49.23	21.13	5.40	0.38 ^{ns}
Crude protein %	67.79	82.14	62.93	67.01	64.33	3.45	0.49 ^{ns}
Crude fibre %	20.61	12.38	44.29	63.57	45.22	7.66	0.20 ^{ns}
Ether extract %	74.01	87.16	83.31	84.05	77.93	1.99	0.23 ^{ns}
NFE %	36.03	35.14	58.18	34.82	-25.06	10.88	0.11 ^{ns}
Lignin %	47.79	48.02	44.93	26.12	46.70	3.30	0.12 ^{ns}
ADF %	40.45	50.35	51.54	54.08	56.91	3.46	0.74 ^{ns}
NDF %	61.91	50.56	51.33	49.71	47.99	2.22	0.33 ^{ns}
Cellulose %	46.55	47.92	61.71	50.32	49.75	2.74	0.51 ^{ns}
Hemicellulose %	37.34^{b}	73.19^{a}	78.16^{a}	71.54^{a}	52.65^{ab}	5.68	0.05 ^{ns}

ADF-acid detergent fibre, NDF- neutral detergent fibre,

CONCLUSION

From this study, sweet orange peel has been identified as an alternative feedstuff and it was evaluated for its potential in cattle production.

Result showed that:

- Incorporation of CPM up to 100 % did not affect the performance and nutrient digestibility of the WAD bucks.

RECOMMENDATION

Based on the findings of this research, it is therefore recommended that

Goat farmers could replace maize offal with CPM up to 100 % in the diets of their animals without any adverse effect.

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